(12) PATENT ABSTRACT (11) Document No. AU-A-87031/91
(19) AUSTRALIAN PATENT OFFICE

(54) Title
BOAT/SUBMARINE WITH ADJUSTABLE WINGS AND HYDROFOILS POWERED BY A MODIFIED JET FAN MOTORS THAT OPERATE UNDER WATER

International Patent Classification(s)
(51)[5] **B63B 001/28** **B63G 008/08** **B63H 011/14**

(21) Application No. : **87031/91** (22) Application Date : **06.11.91**

(30) Priority Data

(31) Number	(32) Date	(33) Country
PK3184	**06.11.90**	**AU AUSTRALIA**
PK3185	**06.11.90**	**AU AUSTRALIA**

(43) Publication Date : **14.05.92**

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(57)

A high speed maritime vessel with limited submarine capabilities. The vessel is a pressure vessel with 4 wings with hydrofoils with shock absorbers to absob vibration and rams to ajust the apposition of the wings. The vessel is powered by an underwater marine jet turbine. Operation of this vessel permits high speed safe ocean travel with high speed submersion and reimmersion characteristics.

P/00/011
Regulation 3.2

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

NOTICE

1. The specification should describe the invention in full and the best method of performing it known to the applicant.
2. The specification should be typed on as many sheets of good quality A4 international size paper as are necessary and inserted inside this form.
3. The claims defining the invention must start on a new page. If there is insufficient space on this form for the claims, use separate sheets of paper. The words "The claims defining the invention are as follows" should appear before claim 1. After the claims the date and the name of the applicant should appear in block letters.
4. This form must be accompanied by (a) a true and exact copy of the description, claims and drawings (if any) and (b) an additional copy of the claims.

(see Pamphlets explaining formal requirements of specifications and drawings)

TO BE COMPLETED BY APPLICANT

Name of Applicant: Grant Mervyn Gilbert Charles EDWARDS

Actual Inventor(s): Grant Mervyn Gilbert Charles EDWARDS

Address for Service: 25 Watson Street, Clontarf. Queensland. Australia

Invention Title: Boat/Submarine with adjustable wings and hydrofoils powered by modified jet fan motors that operate under water.

Details of Associated Provisional Applications: Nos: PK3184, PK3185

The following statement is a full description of this invention, including the best method of performing it known to me:-

The claims defining the invention are as follows:-

This invention relates to a high speed ocean going surface vessel with submarine capabilities.

The design and powering ocean going vessels has been limited by modifying traditional concepts of hull and marine engine design thus creating vessels with only marginal improvements in performance and safety.

The have been a number of proposals which marginally improve the performance of ocean going vessels, but have been limited by conventional motors which operate out of the water, by hull integrity being compromised by vibration and their inability to submerge for short periods to avoid hazardous seas. At high speeds the vessels leap out of the water and the screw or water jet leaves the water resulting in loss of forward motion and control of the vessel. The hulls of the vessels suffer from vibration due to the movement through the water of the hulls or through conventional fixed hydrofoils, as there is no means of vibration absorption. On most vessels, including high speed passenger vessels, allow passengers to move freely on the open decks presenting a potential safety hazard.

These problems are overcome by the present invention, which provides a three skinned pressure vessel with four adjustable hydraulic coil suspended wings with flaps, and hydrofoil wings with flaps on the tip of each wing. The vessel is powered two or four modified jet turbines powered by hydrogen for constant underwater operation located in pods under the hydrofoil wings. The hydrofoils operate under the surface virtually flying in the water under wave action. The hydrofoil flaps are trimmed to remain under the water surface.

The purpose of the vessel is to provide a high speed surface vessel with limited submarine capabilities for naval and commercial applications. The hydraulic coil suspended wings absorb vibration to the hull. The wings are adjustable. The wings are moved into near horizontal position for submarine operation and in some applications for slow speed surface operation. For normal slow and high speed surface operation the wings are moved down at their respective setting for hydrofoil action. The motors operate continuously under water. The setting of the wings and hydrofoil, and the shape of the hull have waving piercing characteristics. The vessel will be able to dive and surface rapidly and move immediately into high speed hydrofoil operation.

In one form of the invention, the passenger cabins, decks and bridge are constructed in modular form. The cabins, rooms and bridge are then joined. A clear thick skin of industrial strength plastic is then molded around the cabins,decks and bridge. The final and outer skin is constructed around the encapsulated cabins and rooms.

The hull is a dual skin hull using a tri-hull configuration for stability for slow speed surface operation. The adjustable wings with hydrofoils and motors, form part of the hull. Water sealable air ducts for the motors form part of the hull. Ballast tanks, fuel tanks, oxygen tanks, air tanks, generators, servos, batteries etc are located in the hull.

The one piece passenger deck is lowered onto the hull and fixed by quick release bolts to separate the hull and the passenger decks in an emergency or for routine maintenance. The general overall shape of the vessel is a wide flat wedge for marine and aero dynamics, and maximum cargo and passenger space.

The adjustable wings are fixed to the hull by means of large diameter axle. Each wing is also fixed by 3 or 4 hydraulic coil shock absorbers to absorb vertical impact and vibration. The wings apposition can be adjusted by either hydraulic rams or worm gear servos attached to the shock absorber plate and the hull. Each wing has adjustable flaps to provide lift and dive for submarine operation. For surface operation the flaps provide hull lift by increasing the air pressure pocket under the hull.

The hydrofoils with flaps are situated at the end of each wing and provide lift and dive for surface operation. During submarine operation the hydrofoils flaps can be used as rudders to assist the motors directional buckets.

The motors are a modified turbine fan jet motors that operate under the water surface at all times. The motors are a twin chambered turbine jet motor. Construction of the motors is primarily industrial grade high temperature plastics and corrosive resistant alloys. The continuous operation of the motor underwater permits the extensive use of plastics.

The air is ducted from the air ducts in the hull to the internal chamber where low pressure compressor fans pump the air to high pressure fans. The high pressure air is pumped into the combustion chambers, pumping out excess water. The fuel is injected into the camber and ignited. The combustion chamber is sealed by preloaded spring seals. On ignition the seals open allowing the exhaust to escape into the high pressure and low pressure turbines where the

exhaust gases heat an mix with the high pressure preheated water which is pumped through the outer chamber by low and high pressure fans.

During limited submarine operation the external air ducts are sealed and air and oxygen is fed into the motors from the storage tanks in the hull.

The steering of the vessel is by the use of directional buckets attached to the end of the motor pods.

In another form of the invention, the vessel can be restricted for surface use only. Two conventional jet turbine motors can be located on tails attached to the rear deck of the vessel and operate continuously out of the water. The removal of ballast tanks, fixing the wings in the surface operation mode with hydraulic coil shock absorbers and adjusting the hydrofoil flaps to disable dive capabilities of the vessel.

The shape of the vessel, the construction materials of the skin, superstructure and engine parts do not form part of the invention. However, the use of conventional hull shapes and construction materials can reduce the vessels effectiveness and ability to operate at high speeds in surface and submarine modes.

The vessel can be made of and suitable marine material that can withstanding high pressures and vibration.

To assist with understanding the invention, reference will now be made to the accompanying drawings which show one example of the invention.

In the drawings:

FIG 1 shows a side elevation of the vessel.

FIG 2 shows a front elevation of the vessel in high speed surface operation mode.

FIG 3 shows a front elevation of the vessel in submarine operation mode.

FIG 4 shows a cut away elevation of the marine jet turbine motor.

FIG 5 shows a sectioned front view of the marine jet turbine motor.

Referring to FIG 1 it can be seen the side elevation of the invention showing the adjustable wings with flaps, each having 3 hydraulic coil shock absorbers, the hydrofoil wings

and flaps and the marine jet motor pods. The diagram shows that the vessel has large panoramic window ports made feasible by using the clear plastic encapsulating the cabins, rooms and internal cavities in the vessel. The vessel is drawn in the high speed surface operation mode.

FIG 2 shows the front elevation of the vessel in high speed operation mode. The apposition of the wings and hydrofoils in this mode is depicted.

FIG 3 shows the front elevation of the vessel in submarine operation mode. The apposition of the wings and hydrofoils is depicted.

FIG 4 shows a section side elevation of the marine jet turbine motor. The diagram shows sprung loaded water seals at the rear of the motor. One set of seals is behind the internal combustion chambers. The seals are there to stop the flooding of the combustion chambers. Any water that does seep into the combustion chambers will be pumped out by pumping air into the chambers creating an air pocket allowing combustion to take place. The second set of water seals are attached to outer chamber as a backup if the internal seals fail. If the combustion chambers seals fail air can be pumped into the chambers forcing the water up into the external chamber towards the front of the motor. On ignition the external chamber seals will open permitting normal operation.

FIG 5 shows a sectioned front view of the marine jet turbine. It shows the air duct that tunnels air into the internal chamber of the motor.

The claims defining the invention are as follows:-

1. A jet turbine powered marine vessel modified for high speed above surface operation with limited submarine capabilities, 4 adjustable hydraulic coil suspension wings with hydrofoils and underwater marine jet turbine motors positioned on the wing tips.

2. The vessel in claim 1 comprises of a wedge shaped sealed pressure vessel, 4 hydraulic coil suspension wings with hydrofoils whose apposition is adjusted by either hydraulic rams or worm gear servos which comprises of a plate to which the hydraulic coil shock absorbers are connected to. The rams or worm gear is connected to the plate and to the hull. The claim refers the variable action and apposition of the wings and not to the general principles of hydrofoil action.

3. The underwater marine jet turbine motors referred to in claim 1 refer to the modifications of an air duct into the internal chamber and to the water seals behind the combustion chambers, the water seals for the external chamber and the ignition and operation of the jet motor under water and not to the general principle of jet turbine motors.

4. A underwater jet turbine powered martime vessel substantially as herein described with reference to accompanying drawings.

..... 3 November 1991

(Name of Applicant)

ABSTRACT

A high speed maritime vessel with limited submarine capabilities. The vessel is a pressure vessel with 4 wings with hydrofoils with shock absorbers to absob vibration and rams to ajust the apposition of the wings. The vessel is powered by an underwater marine jet turbine. Operation of this vessel permits high speed safe ocean travel with high speed submersion and reimmersion characteristics.

FIGURE 1

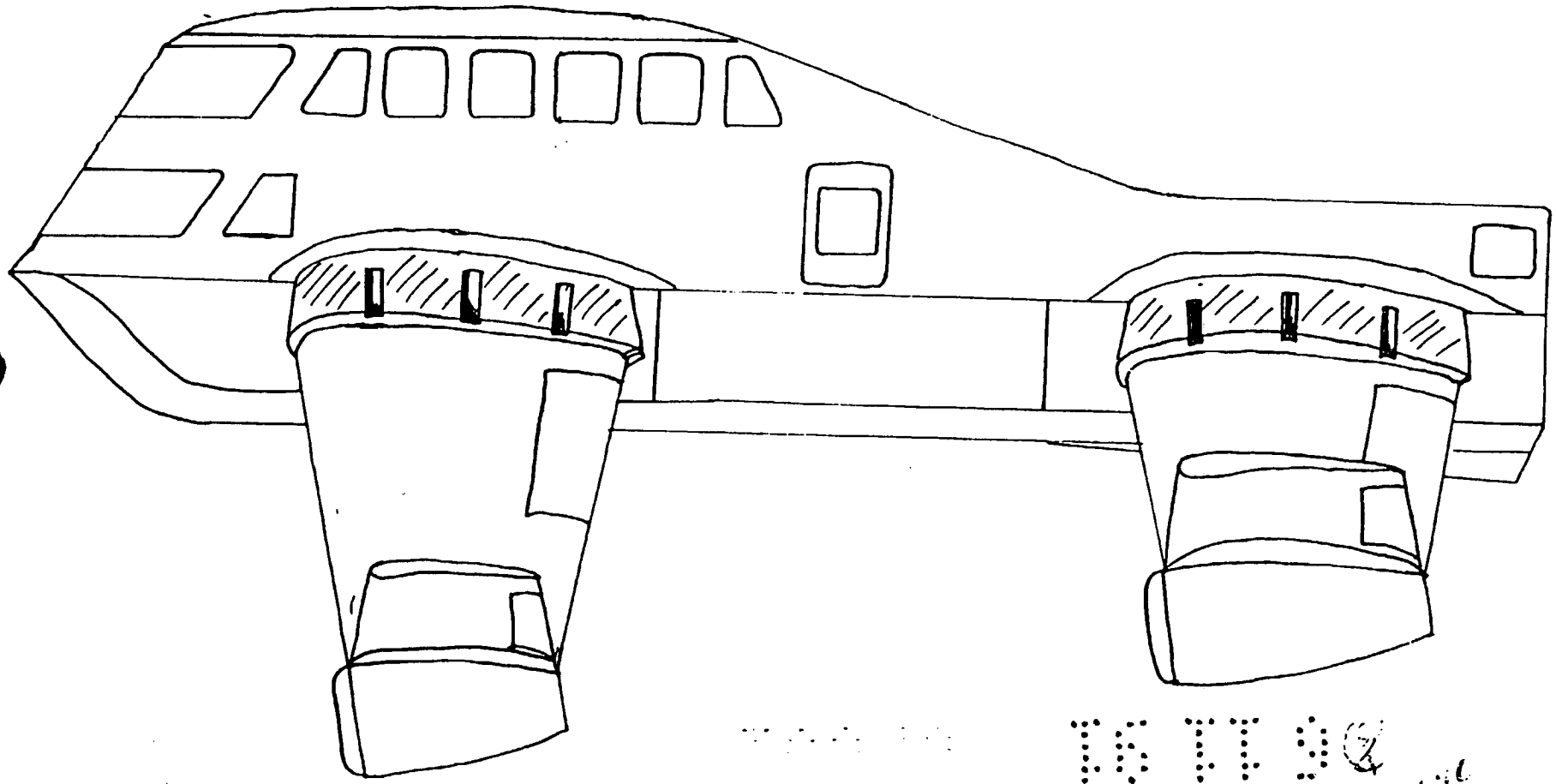

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FIGURE 2

Hydroming Mode

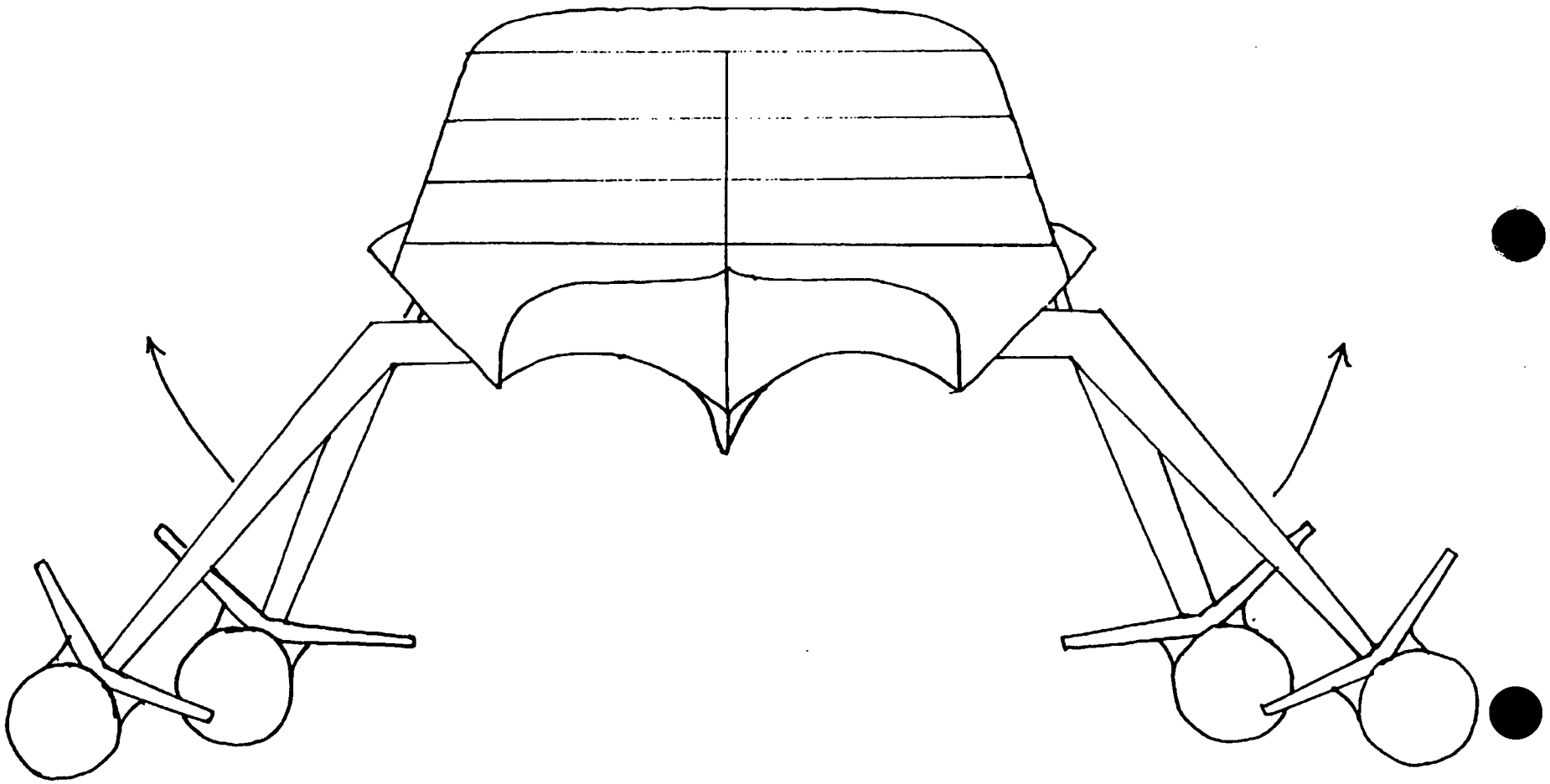

FIGURE 3

Submarine Mode

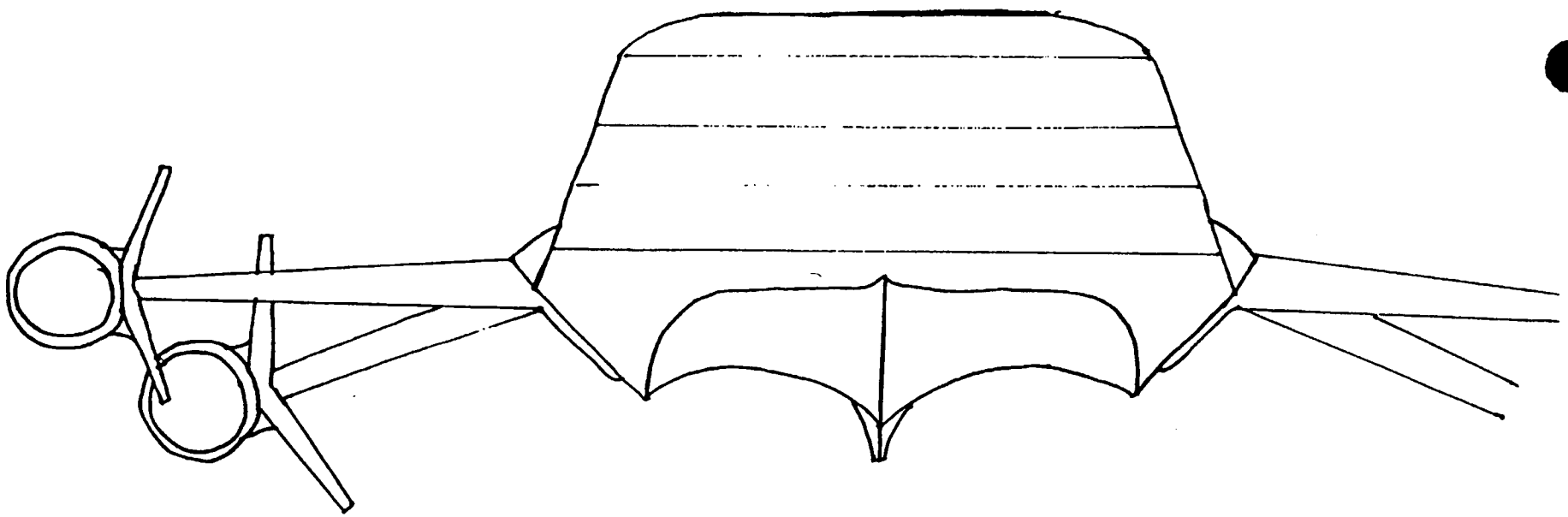

FIGURE 4

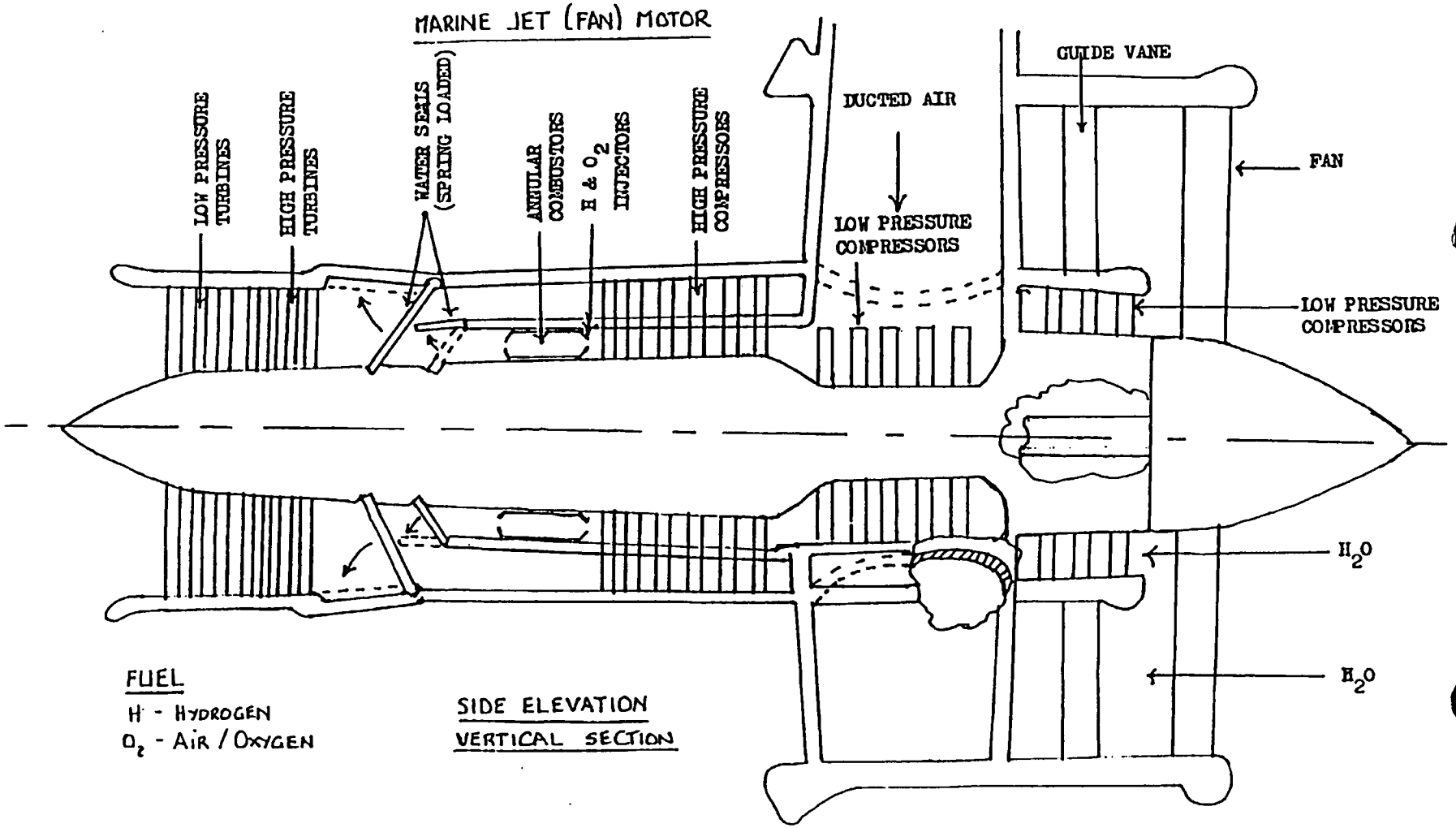

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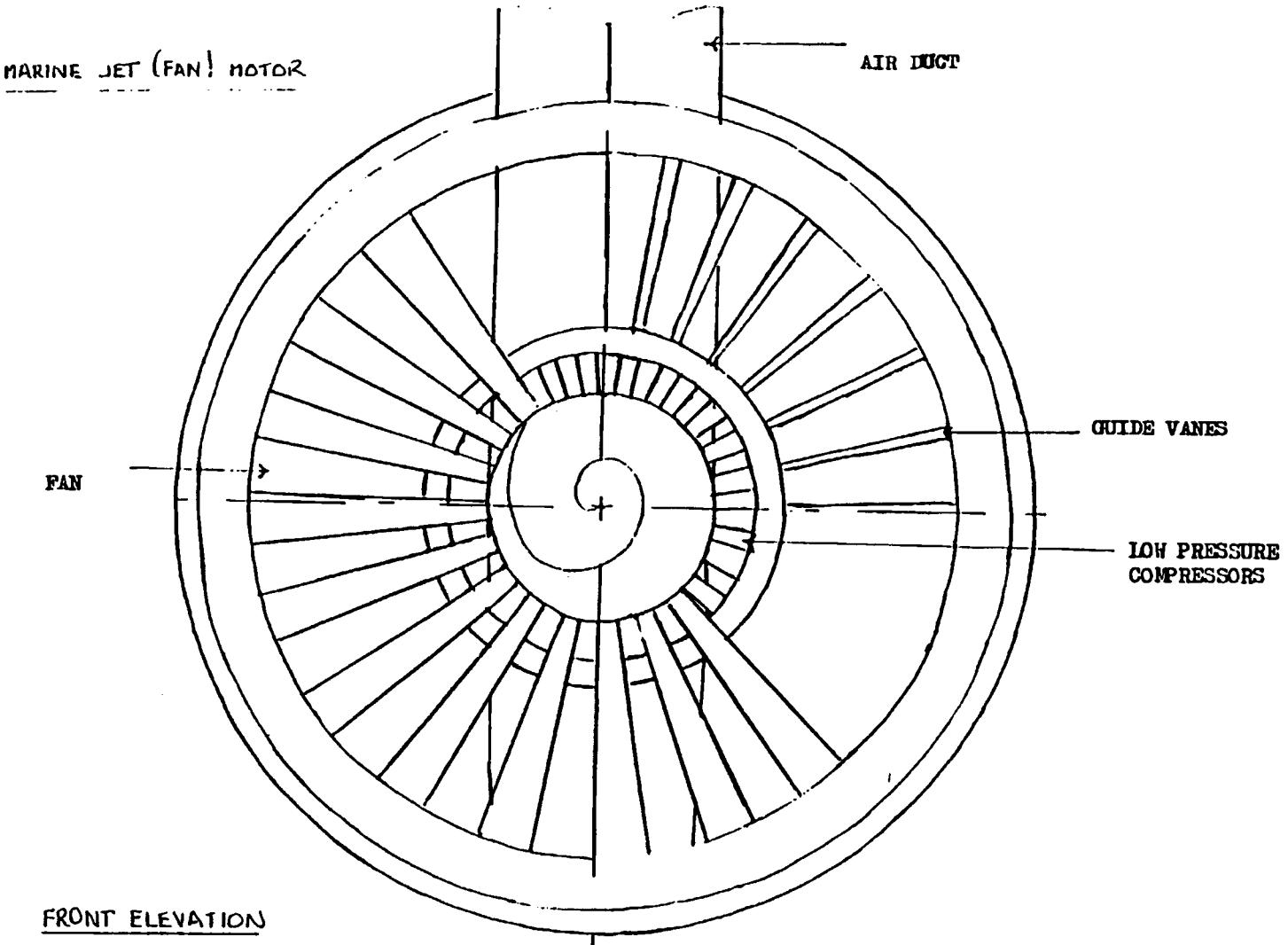
FIGURE 5



FRONT ELEVATION

SECTIONED REVEALING - FAN - LOW PRESSURE COMPRESSORS AND GUIDE VANS

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